Day 289	A Level Maths: S Tier 10-a-day
1 A ball is projected from a point O on horizontal ground at 35 m s^{-1}, at angle θ above the horizontal. It passes through the point P, 60 m horizontally and 4 m vertically from O. Find the two possible values of $\tan\theta$, and the two possible values of θ to 1 d.p. Take g = 9.8 m s^{-2}.	
2 A circle passes through A(−10, 13), B(6, 5) and C(4, −1). Find its equation.	
3 Find the exact value of $\tan(\tan^{-1}(\frac{2}{9}) + \tan^{-1}(\frac{1}{4}))$.	
4 A golf ball is hit from a point O on horizontal ground. It lands 32 m from O, and reaches a maximum height of 20 m above the ground. Find the angle of projection and the speed of projection, to 3 s.f. Take g = 9.8 m s^{-2}.	
5 A curve has parametric equations x = 5 cos t, y = 3 sin t. Find a cartesian equation of the curve, with no fractions.	

Day 289	A Level Maths: S Tier 10-a-day
6 The daily output of a machine is N(μ, 9) with known variance 9. The mean was claimed to be 46 units. A random sample of 64 has mean 47. Test at the 5% level whether the mean is different from 46.	
7 Solve $x - 8\sqrt{x} + 12 = 0$.	
8 Calls arrive at a switchboard at an average rate of 12 per hour, independently and at random. (a) Find the probability of at least 3 in a 15-minute period. (b) Find the probability that, of 8 separate 15-minute periods, exactly 3 have no arrivals.	
9 The curve C has equation $x^2 + xy + 5y^2 = 19$. Find the coordinates of the points on C where the tangent is parallel to the x-axis.	
10 A geometric series has first term 7 and common ratio $\frac{1}{2}$. Find the least n for which S_n exceeds 99% of the sum to infinity.	